

REMARKS

Claims 1 to 5 are all the claims pending in the application.

Claims 1-5 have been rejected under the second paragraph of 35 U.S.C. § 112 as indefinite.

The Examiner sets forth two reasons for this rejection. Applicants discuss each reason below.

The Examiner states that it is unclear what is intended by the term “monomer (B).” The Examiner states that the recited monomer is, in fact, recited to be two different materials, and appears to possibly be a mixture rather than a single monomer.

In response, applicants submit that the recitations relating to “monomer (B)” in claim 1 are clear.

Monomer (B) can be comprised of either 100% of monomer (b-1), as is clear from the phrase “monomer (B) comprising 100 to 50% by weight of a polyfunctional monomer (b-1),” or can be comprised of less than 100%, but greater than 50%, of monomer (b-1) and monomer (b-2).

Applicants submit that one of ordinary skill in the art would readily understand this from the recitations in claim 1.

The Examiner states that the recitation of two “unsaturated bonds” attached to a monomer cannot be said to be “intermolecular.” The Examiner states that perhaps the term “intermolecularly” may have been intended.

In response, applicants have amended the phrase in question to delete the term “intermolecular” and to state that monomer (b-1) has “at least two polymerizable unsaturated bonds in its molecule.”

In view of the above, applicants submit that claims 1-5 comply with the requirements of the second paragraph of 35 U.S.C. § 112 and, accordingly, request withdrawal of this rejection.

Claims 1-5 have been rejected under 35 U.S.C. § 103(a) as obvious over JP 07-331025 to Maeda et al.

Applicants submit that JP ‘025 does not disclose or render obvious the subject matter of the present claims and, accordingly, request withdrawal of this rejection.

The present invention as set forth in claim 1 is directed to a rubber-modified styrene resin composition comprising 99.9 to 97 percent by weight of a rubber-modified styrene resin (E) and 0.1 to 3 percent by weight of a polyorganosiloxane-containing graft copolymer (D).

The polyorganosiloxane-containing graft copolymer (D) is selected from the group consisting of a copolymer (a-1) and a copolymer (a-2). The copolymer (a-1) and the copolymer (a-2) are prepared with a polyorganosiloxane (A) produced by polymerizing 99.9 to 99.6 percent by weight of an organosiloxane with 0.1 to 0.4 percent by weight of a graft-linking agent.

The copolymer (a-1) is prepared by polymerizing 0.01 to 5 parts by weight of a monomer (B) comprising 100 to 50 percent by weight of a polyfunctional monomer (b-1) having at least two polymerizable unsaturated bonds in its molecule and 0 to 50 percent by weight of another copolymerizable monomer (b-2) in the presence of 86 to 94.99 parts by weight of the polyorganosiloxane (A), and then polymerizing the resulting polymer with 5 to 13.99 parts by

weight of a vinyl monomer (C), wherein the sum of the compounds (A), (B), and (C) is 100 parts by weight.

The copolymer (a-2) is prepared by polymerizing 27.5 to 14 parts by weight of a vinyl monomer (C) in the presence of not less than 72.5 and less than 86 parts by weight of the polyorganosiloxane (A), wherein the sum of the compounds (A) and (C) is 100 parts by weight.

JP '025 discloses a resin composition comprised of 70 to 99 parts by weight of a rubber modified styrene resin (A) and 1 to 30 parts by weight of a polyorganosiloxane-based thermoplastic resin (B) prepared by graft polymerization of one or more vinyl monomers, such as styrene, in the presence of a polyorganosiloxane obtained by condensing (i) 90 to 100 weight percent of an organosiloxane having a particular structural unit with (ii) 0 to 10 weight percent of a graft crosslinking agent.

The component (A) of JP '025 would correspond to component (E) of the present claims. The component (B) of JP '025 is somewhat similar to component (D) of the present claims, but as explained in detail below, component (B) of JP '025 does not correspond to component (D) of the present claims.

JP '025 is described in the present specification in the Background Art section at page 2, lines 12-22, as follows:

A method for adding a polyorganosiloxane-containing graft copolymer in order to improve secondary processability of the rubber-modified styrene resin is disclosed in Japanese Unexamined Patent Application Publication No. 7-331025 [=JP '025]. However, when the polyorganosiloxane content in the polyorganosiloxane-containing graft copolymer is high [as is the case for the present application], it is difficult to process the graft copolymer into a powder form. Furthermore, when the polyorganosiloxane-containing graft copolymer is

added to the rubber-modified styrene resin, a problem arises in that the resulting resin has an undesired appearance and low impact resistance.

Table 1, in paragraph [0011] of JP '025, discloses Examples 1 and 2 and Comparative Examples 3 and 4 which contain a component (A) corresponding to component (E) of the present claims in the amount set forth in the present claims, and contain a component (B) corresponding to the amount of component (D) of the present claims. Component (B) in Table 1 of JP '025, however, does not have the same composition as component (D) of the present claims.

In Table 1, Component (B) of JP '025 contains either a component (b-1), (b-2) or (b-3) in an amount of 3% (Examples 1 and 3 and Comparative Example 4), or a component (b-1) present in an amount of 0.5% (Comparative Example 3). These components (b-1), (b-2) and (b-3) are described in paragraph [0009] of JP '025. These components of JP '025 do not satisfy the recitations of component (D) of the present claims.

In particular, components (b-1), (b-2) and (b-3) of Table 1 of JP '025 are described in paragraph [0009] of JP '025 as follows:

Polyorganosiloxane system thermoplastic (b-1) being prepared by

polymerizing 98.5 parts by weight of octamethylcyclotetrasiloxane as an organosiloxane (I) with 1.5 parts by weight of p-vinylphenylmethyl dimethoxysilane as a graft-linking agent (II) to give a polyorganosiloxane (III) and then

polymerizing 55 parts by weight of a vinyl monomer (IV) comprising 46.5 parts by weight of styrene and 18.5 parts by weight of acrylonitrile as a graft component in the presence of 35 parts by weight of polyorganosiloxane (III),

Polyorganosiloxane system thermoplastic (b-2) being prepared by

polymerizing 100 parts by weight of octamethylcyclotetrasiloxane as an organosiloxane (I) without a graft-linking agent (II) and then

polymerizing in the same way as the graft component in (b-1) preparation described above, and

Polyorganosiloxane system thermoplastic (b-3) being prepared by

polymerizing 89.5 parts by weight of octamethylcyclotetrasiloxane as an organosiloxane (I) with 10.5 parts by weight of p-vinylphenylmethyl dimethoxysilane as a graft-linking agent (II) to give a polyorganosiloxane (III) and then

polymerizing in the same way as the graft component in (b-1) preparation described above.

Thus, components (b-1), (b-2) or (b-3) of JP '025 do not satisfy the recitation of component (D) in the present claim 1 of "a polyorganosiloxane (A) produced by polymerizing 99.9 to 99.6 percent by weight of an organosiloxane with 0.1 to 0.4 percent by weight of a graft-linking agent," and do not satisfy the recitations of claim 1 relating to copolymer (a-1) or copolymer (a-2) with respect to the amount of vinyl monomer (C).

Component (B) of JP '025 is also described in paragraphs [0003] to [0005] of JP '025.

In particular, JP '025, in paragraph [0004], indicates that with respect to component (B), the amount of decussation (same as graft-linking) agent (II) to total organosiloxane (I) + graft-linking agent (II) is 0-10% by weight, preferably 0.5 to 5% by weight.

The range "0-10% by weight" of this component (B) of JP '025 somewhat overlaps the recitation in the present claim 1 of "a polyorganosiloxane (A) produced by polymerizing 99.9 to 99.6 percent by weight of an organosiloxane with 0.1 to 0.4 percent by weight of a graft-linking agent." However, such an overlap does not disclose the range set forth in the present claims. See *Atofina v. Great Lakes Chem. Corp.*, 441 F.3d 991 (Fed. Cir. 2006), where the Federal Circuit stated that a slightly overlapping of a range does not anticipate the range. Thus, the Federal Circuit held that a prior art preferred temperature range of 150° to 350°C that slightly

overlaps the claimed range of 330° to 450°C did not anticipate the claimed range, because the slightly overlapping range is not disclosed as being a species of the claimed range of 330 to 450°C.

The preferable range “0.5 to 5% by weight” for this component (B) of JP ‘025 is not within the range of present claim 1 and teaches away from the recitation of present claim 1.

Further, as discussed above, the specific Examples described in JP ‘025 for (b-1), (b-2) or (b-3) do not satisfy the recitations of component (D) of present claim 1.

Additionally, applicants point out that JP ‘025 has a description regarding the polyorganosiloxane component (III) and the vinyl monomer component (IV) of component (B) of JP ‘025 in paragraph [0005], where it is disclosed that the amount of polyorganosiloxane (III) based on 100% by weight of total polyorganosiloxane (III) + vinyl monomer (IV) is preferably 5 to 80% by weight, more preferably 10 to 60% by weight.

Thus, the preferable “5 to 80% by weight” range of the polyorganosiloxane (III) of this component (B) of JP ‘025 is broader than and entirely encompasses the recitation regarding (a-2) in the present claim 1 of “the copolymer (a-2) being prepared by polymerizing 27.5 to 14 parts by weight of a vinyl monomer (C) in the presence of not less than 72.5 and less than 86 parts by weight of the polyorganosiloxane (A), wherein the sum of the compounds (A) and (C) is 100 parts by weight.”

However, such an encompassing of a range does not disclose the range set forth in the present claims. See the above discussed *Atofina v. Great Lakes Chem. Corp.*, 441 F.3d 991 (Fed. Cir. 2006), where the Federal Circuit stated that a prior art disclosure of a temperature range of

100 to 500°C did not anticipate a specific claimed range of 330 to 450°C that was entirely encompassed by the prior art range. Moreover, there is no working Example in JP '025 that is within the claimed range.

Further, the range 5 to 80% by weight range of the polyorganosiloxane (III) of this component (B) of JP '025 does not encompass or overlap the recitation regarding copolymer (a-1) in the present claim 1 of “the copolymer (a-1) being prepared by polymerizing 0.01 to 5 parts by weight of a monomer (B) in the presence of 86 to 94.99 parts by weight of the polyorganosiloxane (A), and then polymerizing the resulting polymer with 5 to 13.99 parts by weight of a vinyl monomer (C), wherein the sum of the compounds (A), (B), and (C) is 100 parts by weight.”

Still further, the more preferable range of the polyorganosiloxane (III) of this component (B) in JP '025 of “10 to 60% by weight” teaches away from the recitations of present claim 1.

In addition, the specific Examples described in JP '025, namely, (b-1), (b-2) or (b-3), which are prepared by polymerizing 65 parts by weight of vinyl monomer (IV) comprising 46.5 parts by weight of styrene and 18.5 parts by weight of acrylonitrile in the presence of 35 parts by weight of polyorganosiloxane (III), does not satisfy the recitation of component (D) of claim 1 of a copolymer “selected from the group consisting of a copolymer (a-1) and a copolymer (a2).”

In view of the above, applicants submit that JP '025 does not disclose or render obvious the subject matter of claims 1 to 5 and, accordingly, request withdrawal of this rejection.

Claims 1-5 have been rejected under 35 U.S.C. § 103(a) as obvious over U.S. Patent Application Publication 2003/0092819 to Miyatake et al.

Applicants submit that Miyatake et al do not disclose or render obvious the subject matter of claims 1-5 and, accordingly, request withdrawal of this rejection.

Miyatake et al disclose, in paragraph [0011], a rubber modified resin obtained by polymerizing a vinyl monomer in the presence of (A) a silicone rubber latex and (B) an acrylic rubber latex.

There are alternative interpretations that can be applied to the disclosure of Miyatake et al of a “rubber modified resin,” which applicants refer to hereafter as Case 1 and Case 2. Each of these interpretations, however, do not lead one of ordinary skill in the art to the present invention.

In the Case 1 alternative, the acrylic rubber latex (B) of Miyatake et al can be considered to correspond to the component (E) of the present claims, and the silicone rubber latex (A) of Miyatake et al can be considered to be similar to component (D) of the present claims.

Case 1 is based on the following assumptions:

- (i) Miyatake et al’s rubber modified resin corresponds to “a rubber-modified styrene resin composition” of the present claims,
- (ii) Miyatake et al’s acrylic rubber latex (B) corresponds to component (E) of the present claims, that is, it is a rubber modified styrene resin of the present claims, and
- (iii) Miyatake et al’s silicone rubber latex (A) corresponds to component (D) of the present claims, that is, it is a polyorganosiloxane-containing graft copolymer of the present claims.

With the above assumptions, the following analysis applies:

With respect to the above Case 1 assumptions, Miyatake et al disclose, in paragraph [0066], that the silicone rubber latex (A) can be present in an amount of from 1 to 90% by weight, especially from 1 to 50% by weight, and more especially from 1 to 20% by weight, based on the whole rubber component comprised of the silicone rubber plus acrylic rubber. These ranges are not the same as the 0.1 to 3% range for component (D) set forth in the present claims. See the *Atofina* case discussed above.

Example 1 of Miyatake et al contains the silicone rubber latex (A) in an amount of 11.9%, which is higher than the 0.1 to 3% amount of component (D) of the present claims.

Examples 5 and 6 of Miyatake et al disclose that the silicone rubber latex (A) was used in an amount of 18%, which again is higher than the 0.1 to 3% amount of component (D) of the present claims.

In view of the above, applicants submit that with respect to the Case 1 assumptions, Miyatake et al do not disclose or suggest a range of 0.1 to 3% for component (D) of the present claims.

Further, Comparative Examples 6 and 8 of the present application show what happens when a component (D), namely, copolymer D-2, is used in an amount that is higher than set forth in the present claims. These Comparative Examples had a tensile strength lower than for invention Examples 2 and 3, which also employed copolymer D-2, and had a moldability property B (unsatisfactory) instead of a moldability property A (satisfactory) as obtained in Examples 2 and 3.

Accordingly, applicants submit that the compositions of the present claims produce better results than those of Miyatake et al for the Case 1 assumptions.

In view of the above, applicants submit that the Case 1 interpretation of Miyatake et al does not render obvious the subject matter of the present claims.

Applicants now turn to the Case 2 interpretation of Miyatake et al.

Case 2 is based on the following assumptions:

- (i) Miyatake et al's rubber modified resin corresponds to component (D) that is, it is a polyorganosiloxane-containing graft copolymer of the present claims,
- (ii) Miyatake et al's acrylic rubber latex (B) does not have its counterpart in the present claims, and
- (iii) Miyatake et al's silicone rubber latex (A) corresponds to component (A) of the present claims, that is, it is a polyorganosiloxane of the present claims.

Further, Miyatake et al disclose, for example, in claims 6 and 7, that Miyatake et al's rubber modified resin may be mixed into a thermoplastic resin such as ABS which is a typical "rubber-modified styrene resin," recited as component (E) in the present claims.

As discussed above, Example 1 of Miyatake et al contains the silicone rubber latex (A) in an amount of 11.9%. This amount is far lower than the amount of polyorganosiloxane (A) employed in either component (D) of the present claims, wherein component (D) is either copolymer (a-1) or (a-2) of the present claims. Thus, the 11.9% amount of (A) in Example 1 of

Miyatake et al is far lower than the 86% lower limit of the polyorganosiloxane (A) in copolymer (a-1) of the present claims or the 72.5% lower limit of the polyorganosiloxane (A) in copolymer (a-2) of the present claims.

As discussed above, Examples 5 and 6 of Miyatake et al disclose that the silicone rubber latex (A) was used in an amount of 18%. This amount is far lower than the 86% lower limit of the polyorganosiloxane (A) for copolymer (a-1) of the present claims, or the 72.5% lower limit of the polyorganosiloxane (A) for copolymer (a-2) of component (A) of the present claims.

Thus, Miyatake et al do not disclose or suggest a range of 86 to 94.99 parts by weight for copolymer (a-1), or 72.5 and less than 86 parts by weight for copolymer (a-2), of the polyorganosiloxane (A) of the present claims.

In view of the above, applicants submit that the Case 2 interpretation of Miyatake et al does not render obvious the subject matter of the present claims.

Accordingly, applicants submit that the present invention is patentable over Miyatake et al and, therefore, request withdrawal of this rejection.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

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